

### **Amendments to and Listing of the Claims:**

The listing of the claims will replace all prior versions, and listings, of the claims in the application. Please amend claims 1-19 as follows:

1. (Currently amended)      A fiducial marker holder apparatus ~~[(20)]~~ for image-guided surgery comprising:

an open-ended frame ~~[(30)]~~ having first and second arms ~~(32, 33)~~, the open-ended frame ~~[(30)]~~ being configured to be removably attached to a maxillary holding device ~~[(50)]~~ and the first arm ~~[(32)]~~ having at least one marker attachment point ~~(48a-48h)~~ that receives fiducial markers ~~[(48)]~~; and

a marker attachment device ~~[(40)]~~ disposed at a distal end of the second arm ~~[(33)]~~ of the open-ended frame ~~[(30)]~~, the marker attachment device ~~[(40)]~~ having a plurality of marker attachment points ~~(48a-48h)~~ that receive fiducial markers ~~[(48)]~~, at least two of the marker attachment points ~~(48a-48h)~~ of the marker attachment device ~~[(40)]~~ being configured to receive fiducial markers ~~[(48)]~~ in different orientations with respect to the marker attachment device ~~[(40)]~~ and each other ~~(48a-48h)~~.

2. (Currently amended)      The fiducial marker holder apparatus ~~[(20)]~~ according to claim 1, wherein the marker attachment device ~~[(40)]~~ is movably attached to the second arm ~~[(33)]~~ of the open-ended frame ~~[(30)]~~.

3. (Currently amended)      The fiducial marker holder apparatus ~~[(20)]~~ according to claim 2, wherein the marker attachment device ~~[(40)]~~ is configured to be fixedly oriented in more than one position.

4. (Currently amended)      The fiducial marker holder apparatus ~~[(20)]~~ according to claim 1, further comprising an additional marker attachment device ~~[(40)]~~ disposed at a distal end of the first arm ~~[(32)]~~ of the open-ended frame ~~[(30)]~~, the additional

marker attachment device ~~[(40)]~~ having a plurality of marker attachment points ~~(48a-48h)~~ that receive fiducial markers ~~[(48)]~~.

5. (Currently amended) The fiducial marker holder apparatus ~~[(20)]~~ according to claim 1, wherein the marker attachment points ~~(48a-48h)~~ are each configured as one of a threaded socket, a threaded post, a through-hole, a post, a socket and a detent.

6. (Currently amended) A fiducial marker holder apparatus ~~(120, 220)~~ for image-guided surgery comprising:

a maxillary holding device ~~[(50)]~~ configured to be temporarily secured to only a maxillary-region of a patient;

an open-ended frame ~~(130, 230)~~ having first and second arms ~~(132, 232, 133, 233)~~, the open-ended frame ~~(130, 230)~~ being configured to be removably attached to the maxillary holding device ~~[(50)]~~, the first arm ~~(132, 232)~~ having at least one marker attachment point ~~(148a-148n, 248a-248l)~~ that receives fiducial markers ~~[(48)]~~ and the second arm ~~(133, 233)~~ having a plurality of marker attachment points ~~(148a-148n, 248a-248l)~~ that receive fiducial markers ~~[(48)]~~, at least two of the marker attachment points ~~(148a-148n, 248a-248l)~~ of the second arm ~~(133, 233)~~ being configured to receive fiducial markers ~~[(48)]~~ in different orientations with respect to the open-ended frame ~~(130, 230)~~ and each other ~~(148a-148n, 248a-248l)~~.

7. (Currently amended) The fiducial marker holder apparatus ~~(120, 220)~~ according to claim 6, wherein the open-ended frame ~~(130, 230)~~ is rigid.

8. (Currently amended) The fiducial marker holder apparatus ~~(120, 220)~~ according to claim 6, wherein the open-ended frame ~~(130, 230)~~ is formed of one of a carbon-fiber material, a non-metallic composite, and a polymeric material.

9. (Currently amended) The fiducial marker holder apparatus ~~(120, 220)~~ according to claim 6, wherein the marker attachment points ~~(148a-148n, 248a-248l)~~ are each configured as one of a threaded socket, a threaded post, a through-hole, a post, a socket and a detent.

10. (Currently amended) The fiducial marker holder apparatus ~~(120, 220)~~ according to claim 6, wherein the second arm ~~(133, 233)~~ has a first portion ~~(133a, 233a)~~ and a second portion ~~(133b, 233b)~~ extending at an angle ~~[(a)]~~ from the first portion ~~(133a, 233a)~~.

11. (Currently amended) The fiducial marker holder apparatus ~~(120, 220)~~ according to claim 6, wherein the first arm ~~(132, 232)~~ has a plurality of marker attachment points ~~(148a-148n, 248a-248l)~~ that receive fiducial markers ~~[(48)]~~ and the first arm ~~(132, 232)~~ has a first portion ~~(132a, 232a)~~ and a second portion ~~(132b, 232b)~~ extending at an angle ~~[(a)]~~ from the first portion ~~(132a, 232a)~~.

12. (Currently amended) The fiducial marker holder apparatus ~~(120, 220)~~ according to claim 6, wherein the maxillary holding device ~~[(50)]~~ includes a locking dental acrylic resin splint that is custom molded for a particular patient.

13. (Currently amended) The fiducial marker holder apparatus ~~(120, 220)~~ according to claim 6, wherein the maxillary holding device ~~[(50)]~~ is fastened directly to the patient by fasteners.

14. (Currently amended) A fiducial marker holder system ~~(120, 220)~~ for image-guided surgery comprising:

a maxillary holding device ~~[(50)]~~ having a first clamping part ~~[(52)]~~, a second clamping part ~~[(54)]~~ and a fixing tool ~~[(56)]~~, the fixing tool ~~[(56)]~~ being configured to

temporarily secure the first and second clamping parts ~~(52, 54)~~ to only a maxillary-region of a patient;

an open-ended frame ~~(130, 230)~~ having first and second arms ~~(132, 232, 133, 233)~~, the open-ended frame ~~(130, 230)~~ being configured to be removably attached to the maxillary holding device ~~[(50)]~~, the first arm ~~(133, 233)~~ having at least one marker attachment point ~~(148a-148n, 248a-248l)~~ that receives fiducial markers ~~[(48)]~~ and the second arm ~~(133, 233)~~ having a plurality of marker attachment points ~~(148a-148n, 248a-248l)~~ that receive fiducial markers ~~[(48)]~~, at least two of the marker attachment points ~~(148a-148n, 248a-248l)~~ of the second arm ~~(133, 233)~~ being configured to receive fiducial markers ~~[(48)]~~ in different orientations with respect to the open-ended frame ~~(130, 230)~~ and each other ~~(148a-148n, 248a-248l)~~; and

a reference emitter ~~[(90)]~~ configured to be removably attached to the maxillary holding device ~~[(50)]~~ or the open-ended frame ~~(130, 230)~~.

15. (Currently amended) The fiducial marker holder system ~~(120, 220)~~ according to claim 14, wherein the open-ended frame ~~(130, 230)~~ is formed of a rigid material.

16. (Currently amended) The fiducial marker holder system ~~(120, 220)~~ according to claim 14, wherein the first arm ~~(132, 232)~~ has a plurality of marker attachment points ~~(148a-148n, 248a-248l)~~ that receive fiducial markers ~~[(48)]~~.

17. (Currently amended) The fiducial marker holder apparatus ~~(120, 220)~~ according to claim 14, wherein the marker attachment points ~~(148a-148n, 248a-248l)~~ are each configured as one of a threaded socket, a threaded post, a through-hole, a post, a socket and a detent.

18. (Currently amended) A method of performing image-guided surgery on a patient using a maxillary holding device ~~[(50)]~~, an open-ended frame ~~(30, 130, 230)~~, a plurality

of fiducial markers ~~[(48)]~~, a reference emitter ~~[(90)]~~, a surgical probe/instrument ~~[(320)]~~ and an image-guided surgical system ~~[(300)]~~ having a tracking sensor ~~[(325)]~~, the method comprising:

- (a) attaching the open-ended frame ~~(30, 130, 230)~~ with the plurality of fiducial markers ~~[(48)]~~ to a patient using the maxillary holding device ~~[(50)]~~;
- (b) acquiring a preoperative scan of the patient and the open-ended frame ~~(30, 130, 230)~~ with the plurality of fiducial markers ~~[(48)]~~;
- (c) removing the maxillary holding device ~~[(50)]~~ from the patient;
- (d) making a surgical plan, by the surgeon, from the preoperative scan;
- (e) calculating the position of any point in or on the patient relative to the frame ~~(30, 130, 230)~~;
- (f) attaching the reference emitter ~~[(90)]~~ to the frame ~~(30, 130, 230)~~;
- (g) activating the tracking sensor ~~[(325)]~~ which then begins tracking the reference emitter ~~[(90)]~~ and the frame ~~(30, 130, 230)~~;
- (h) calibrating the frame ~~(30, 130, 230)~~ and the reference emitter ~~[(90)]~~, while the patient is being prepared for surgery, so that the position of the frame ~~(30, 130, 230)~~ relative to the reference emitter ~~[(90)]~~ is determined;
- (i) calculating the position of the frame ~~(30, 130, 230)~~ relative to the reference emitter ~~(90)]~~;
- (j) removing the frame ~~(30, 130, 230)~~ with the plurality of fiducial markers ~~[(48)]~~ from maxillary holding device ~~[(50)]~~;
- (k) attaching the maxillary holding device ~~[(50)]~~ with the reference emitter ~~[(90)]~~ to the patient;
- (l) calculating the position of any point in the intraoperative-imaged patient anatomy relative to the reference emitter ~~[(90)]~~;
- (m) activating a surgical probe/instrument ~~[(320)]~~;

- (n) tracking the reference emitter ~~[(90)]~~ and the surgical probe/instrument ~~[(320)]~~ simultaneously;
- (o) calculating the position of the surgical probe/instrument ~~[(320)]~~ relative to the patient's anatomy; and
- (p) using the image-guided surgical system ~~[(300)]~~ to guide surgery.

19. (Currently amended) A method of calibrating an image-guided surgical system ~~[(300)]~~ that is used to perform image-guided surgery on a patient using a maxillary holding device ~~[(50)]~~, an open-ended frame ~~(30, 130, 230)~~, a plurality of fiducial markers ~~[(48)]~~, a reference emitter ~~[(90)]~~, a surgical probe/instrument ~~[(320)]~~ and the image-guided surgical system ~~[(300)]~~ having memory and a tracking sensor ~~[(325)]~~, the method comprising:

- (a) attaching the open-ended frame ~~(30, 130, 230)~~ with the plurality of fiducial markers ~~[(48)]~~ to a patient using the maxillary holding device ~~[(50)]~~;
- (b) acquiring a preoperative scan of the patient and the open-ended frame ~~(30, 130, 230)~~ with the plurality of fiducial markers ~~[(48)]~~;
- (c) removing the maxillary holding device ~~[(50)]~~ from the patient;
- (d) attaching the reference emitter ~~[(90)]~~ to either the open-ended frame ~~(30, 130, 230)~~ or the maxillary holding device ~~[(50)]~~;
- (e) activating the tracking sensor ~~[(325)]~~ which then begins tracking the reference emitter ~~[(90)]~~;
- (f) activating the surgical probe/instrument ~~[(320)]~~;
- (g) tracking the reference emitter ~~[(90)]~~ and the surgical probe/instrument ~~[(320)]~~ simultaneously and continuously calculating the position of the surgical probe/instrument ~~[(320)]~~ relative to the reference emitter ~~[(90)]~~; and
- (h) calibrating the image-guided surgical system ~~[(300)]~~ with respect to the frame ~~(30, 130, 230)~~ and the reference emitter ~~[(90)]~~ by touching the surgical probe/instrument ~~[(320)]~~ to each fiducial marker ~~[(48)]~~, so that the position of the frame ~~(30, 130, 230)~~ relative

to the reference emitter ~~[(90)]~~ is determined and stored in the memory of the image-guided surgical system ~~[(300)]~~.